Challenge Project

Similar Figures

Similar Figures

Lessons based on the CMP

Stretching and Shrinking

Similarity

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Overview

The project uses GSP and is based on the CMP text, Stretching and Shrinking *Similarity.* Three lessons are presented.

- Lesson 1 – Creating Similar Figures
- Lesson 2 – The WUMP Family
- Lesson 3 – Understanding Similar Figures

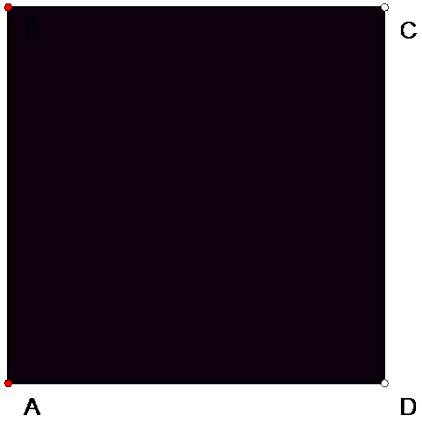
Lesson Overviews

- **Lesson 1: Creating Similar Figures -** Students create a similar shape using a coordinate system. Students will begin to form a more precise mathematical definition of similar.
- **Lesson 2 – The WUMP Family** – students graph members of a fractious family, plus other figures that claim to be in the Wump family. Members are similar to one another. The imposters are not similar. Students compare the shapes' side lengths and angles of the figure they have drawn.
- **Lesson 3 – Understanding Similar Figures –** Students expand on their understanding of similarity to include the relationship of scale factor, perimeter and area.

Lesson 1: Creating Similar Figures

The coordinates of the square below are:
A (1,2)
B (1,7)
C (6,7)
D (6,2)

What are the cordinates of a new square with a scale factor of 2?



m $\overline{AB}$ = 5 cm

m $\overline{BC}$ = 5 cm

m $\overline{CD}$ = 5 cm

m $\overline{DA}$ = 5 cm

Perimeter DCBA = 20 cm

Area DCBA = 25 cm^2

Lesson 1: Creating Similar Figures

Name_____Date:_____

Lesson 1 – Creating Similar Figures

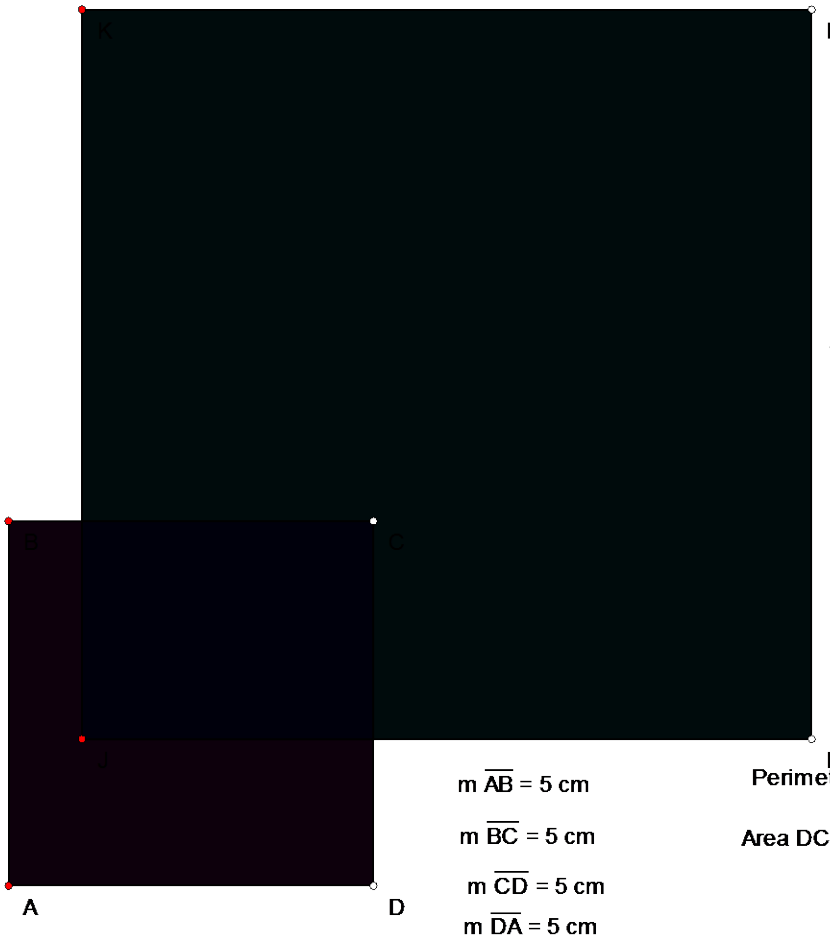
1.The coordinates of the square below are: A (1,2), B (1,7), C (6,7), D (6,2)8

Problem 1 – Creating Similar Figures

What are the coordinates of a new square (JKLM) with a scale factor of 2?
Plot the new figure on the coordinate grid below.

1. What are the coordinates of a new square (JKLM) with a scale factor of 2?
2. Plot the new figure on the coordinate grid below.
3. What is the perimeter of figure ABCD?
4. What is the area of figure ABCD?
5. What is the perimeter of figure JKLM?
6. What is the area of figure JKLM?

Lesson 1: Creating Similar Figures



m $\overline{JK}$ = 10 cm

m $\overline{KL}$ = 10 cm

m $\overline{LM}$ = 10 cm

m $\overline{MJ}$ = 10 cm

Perimeter new square = 40 cm

Area new square = 100 cm^2

m $\overline{AB}$ = 5 cm

m $\overline{BC}$ = 5 cm

m $\overline{CD}$ = 5 cm

m $\overline{DA}$ = 5 cm

Perimeter DCBA = 20 cm

Area DCBA = 25 cm^2

The coordinates of the square below are:

A (1,2)
B (1,7)
C (6,7)
D (6,2)

What are the cordinates of a new square with a scale factor of 2?

J: (2, 4)

K: (2, 14)

L: (12, 14)

M: (12, 4)

Lesson 2: The WUMP Family

Name: _____ Date: _____

Lesson 2 – Drawing Wumps

Zack and Marta's computer game involves a family called the Wumps. The members of the Wump family are various sizes, but they all have the same shape. Mug Wump is the game's main character. By enlarging or reducing Mug, a player can transform him into other Wump family members. Zack and Marta experimented on paper with enlarging and reducing figures on a coordinate grid. First Zack drew Mug Wump on dot paper. Then, he labeled the key points from A to Z and from AA to FF and listed the coordinates for each point. Marta described the rules that would transform Mug into different sizes to create other members of the Wump family.

Problem 2.1

Lurking among the members of the Wump family are some impostors who, at first glance, look like the Wumps but are actually quite different.

A. Use the instructions below to draw Mug Wump on the dot paper grid .

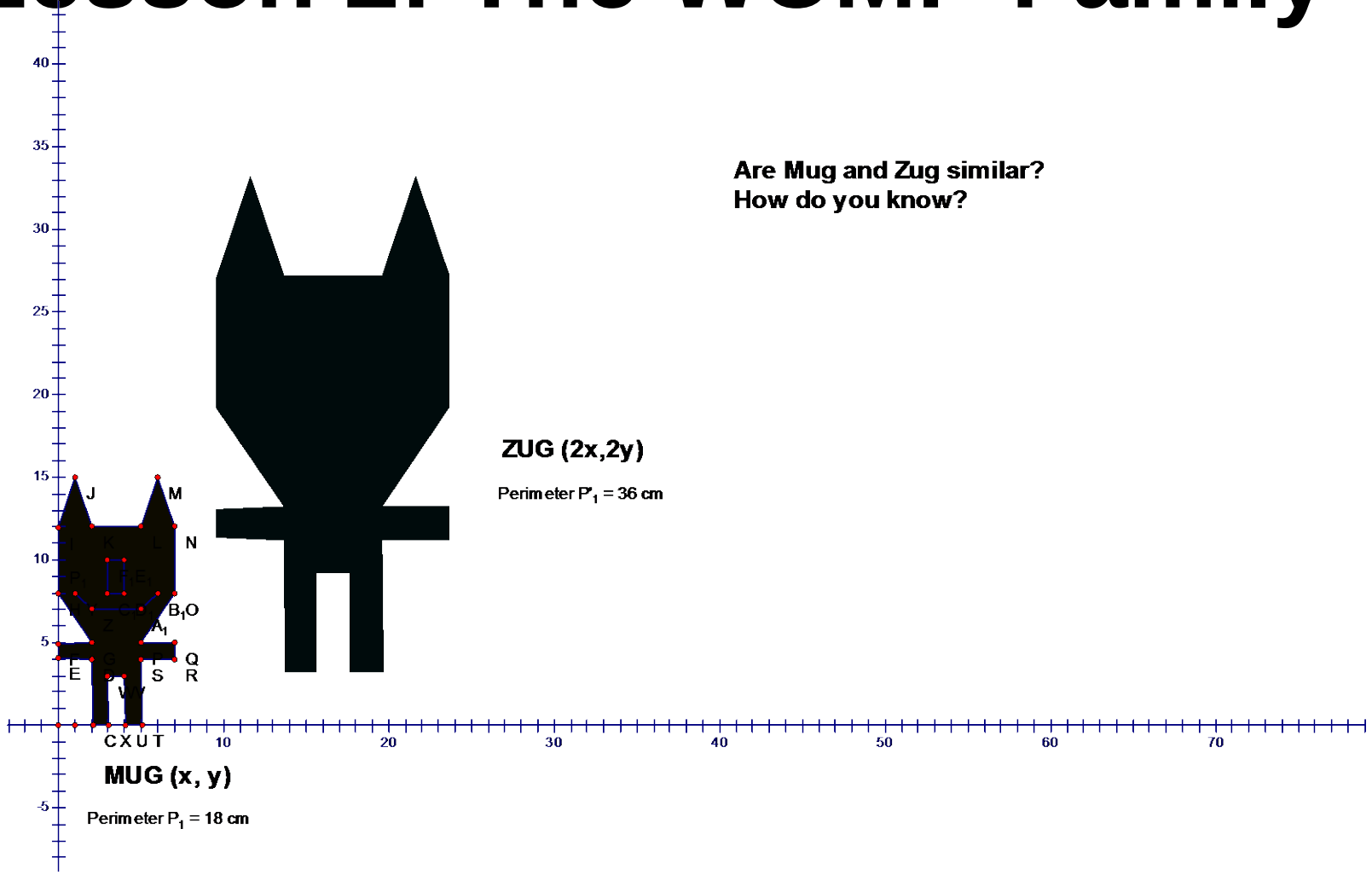
B. Make Bug, Lug, Thug and Zug. After drawing the character, compare them to Mug. Which characters are the imposters?

C. Compare Mug to the other characters. What things are the same about Mug and Zug's? Mug and Bug? Mug and Thug? What things are different? Think about the general shape, the lengths of sides, and the angles of each figure.

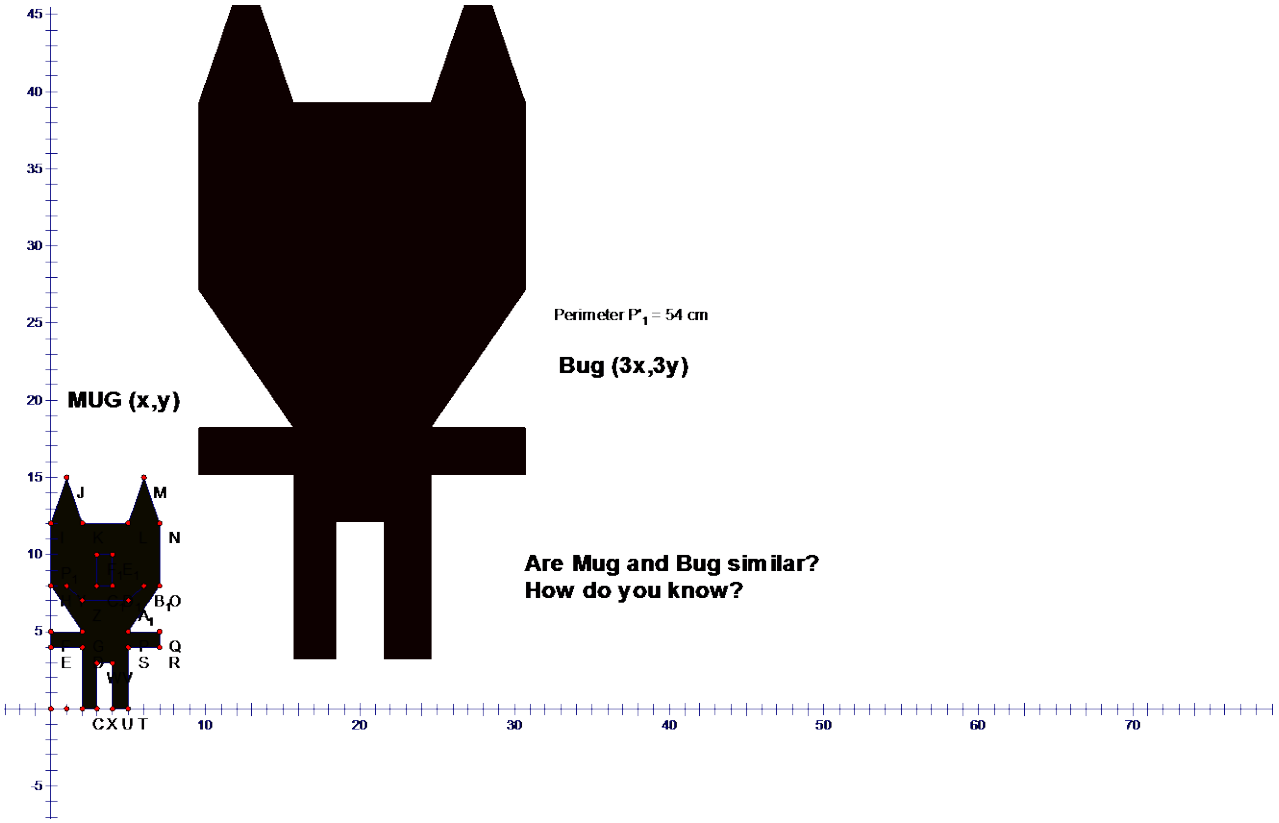
Instructions for drawing Wumps

1.

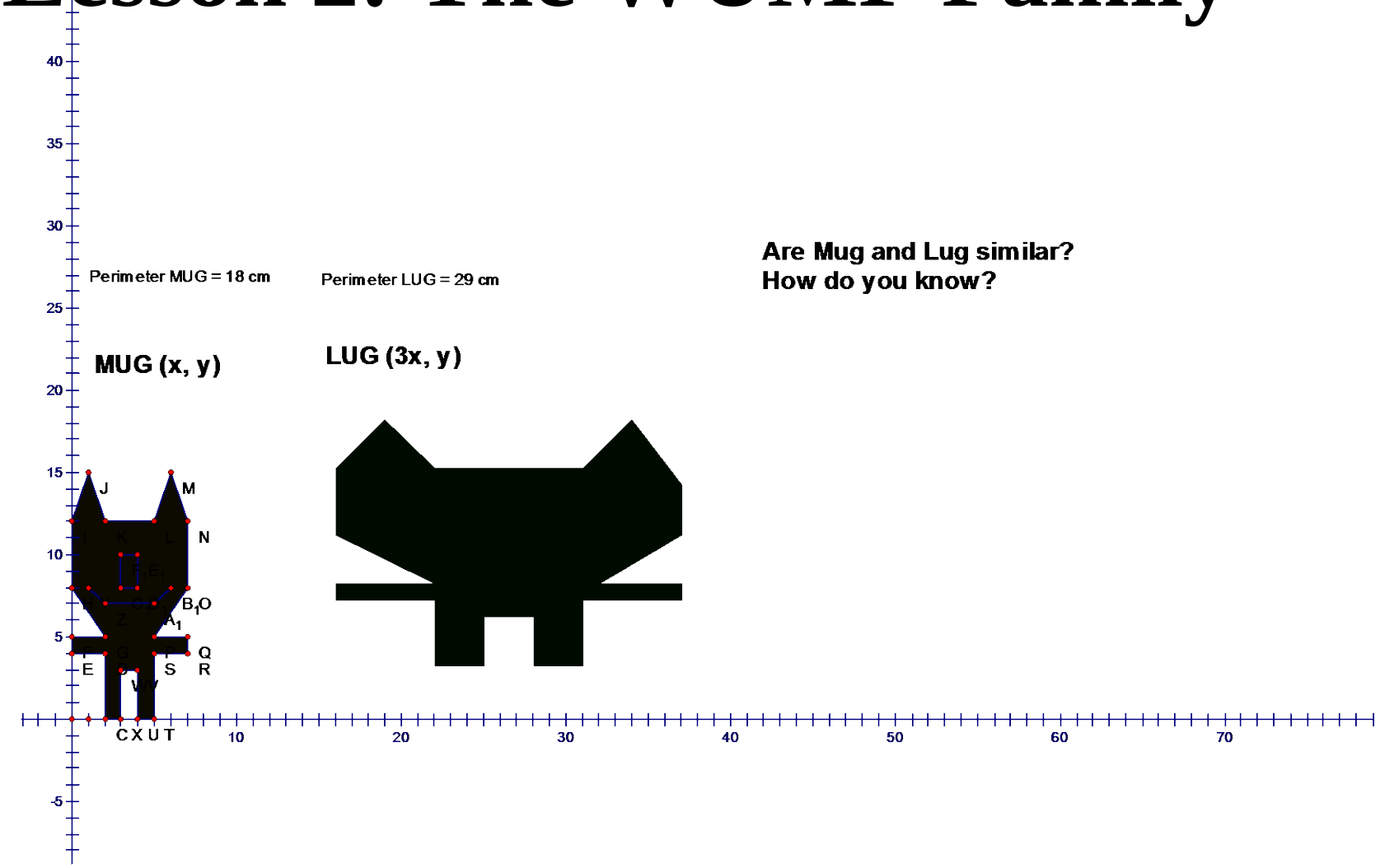
Lesson 2: The WUMP Family



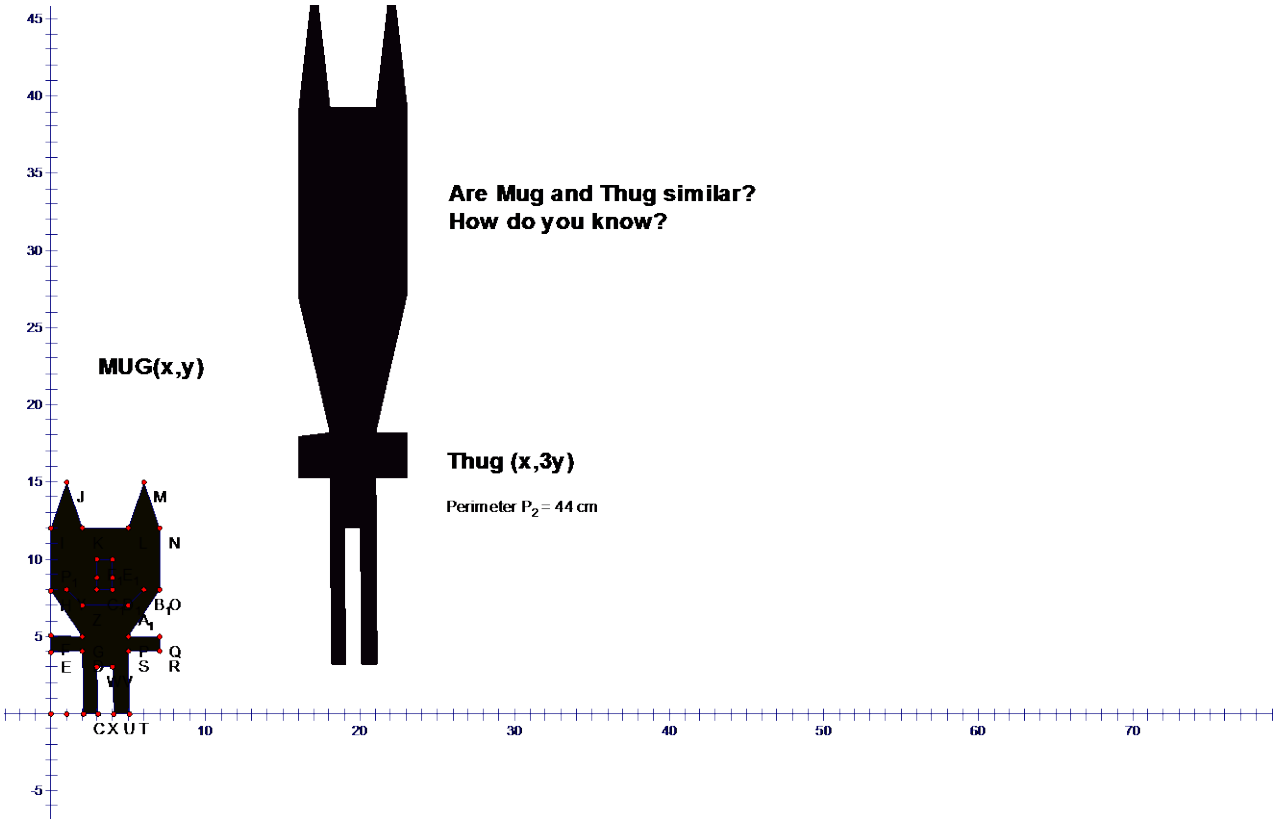
Lesson 2: The WUMP Family



Lesson 2: The WUMP Family



Lesson 2: The WUMP Family



Lesson 3: Understanding Similar Figures

Name: _____ Date:_____

Lesson 3 – Understanding Similar Figures

Examine the two similar figures below and answer the questions below.**Figure A**9 Units9 Units

Problem 3 – Understanding Similar Figures

1.What is the scale factor?

a) From Figure B to Figure A.

b) From Figure A to Figure B

2.What is the ratio of the corresponding sides?

3. a) What is the perimeter of figure A? What is the perimeter of figure B?

b) What is the ratio of the perimeters?

4. a) What is the area of figure A (Area = ½ base x height)? What is the area of figure B?

b) What is the ratio of the areas?

5. How do the ratios of the perimeters relate to the ratios of the areas?

6. How many small triangles will fit into the large triangle?

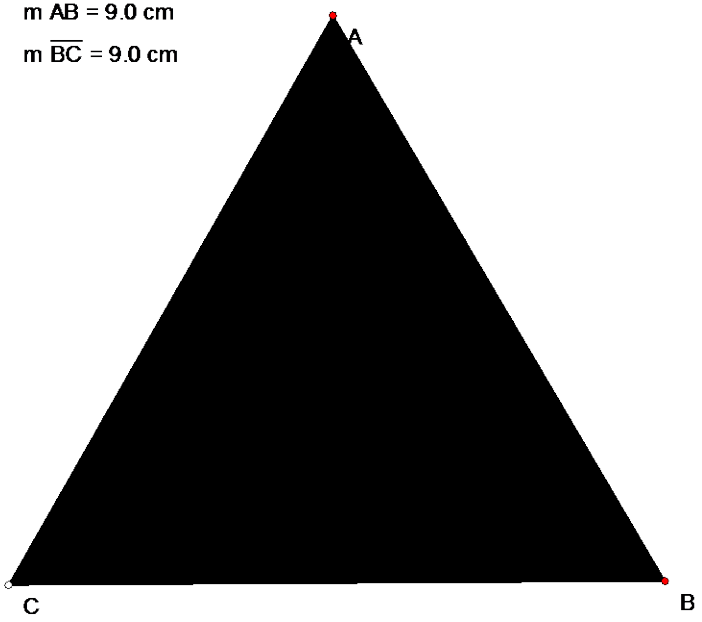
Lesson 3: Understanding Similar Figures

How does the ratio of the corresponding sides and the ratio of the corresponding perimeters relate to ratios of the corresponding areas?

m $\overline{CA}$ = 9.0 cm

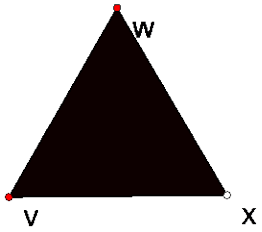
m $\overline{AB}$ = 9.0 cm

m $\overline{BC}$ = 9.0 cm



What is the ratio of the corresponding sides?

How many small triangles will fit into the larger one?



m $\overline{VW}$ = 3.0 cm

m $\overline{WX}$ = 3.0 cm

m $\overline{XV}$ = 3.0 cm

References

Stretching and Shrinking ***Similarity***

Lappan, Fey, Fitzgerald, Friel, and Phillips

Prentice Hall – 2002 Glenview, Illinois